

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

December 29, 2016

Mr. Anthony R. Brown
Environmental Manager
Atlantic Richfield Company
4 Centerpointe Drive, LPR 4-435
La Palma, CA 90623-1066

**Re: EPA Accepts ARC Response to EPA and LRWQCB Comments on the Final
Baseline Human Health Risk Assessment Work Plan, Remedial Investigation and
Feasibility Study, Leviathan Mine Site, Alpine County, California, Dated
February 19, 2016; and Revised Tables 4.1 and 4.2 dated June 27, 2016**

Dear Mr. Brown,

The US Environmental Protection Agency (EPA) has reviewed Atlantic Richfield Company's (ARC) Response to EPA and LRWQCB Comments on the Final Baseline Human Health Risk Assessment Work Plan, Remedial Investigation and Feasibility Study, Leviathan Mine Site, Alpine County, California, dated February 19, 2016; and Revised Tables 4.1 and 4.2 dated June 27, 2016. This work was submitted to EPA pursuant to Administrative Order for Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California (CERCLA Docket No. 2008-18, June 23, 2008).

Background: The Draft Baseline Human Health Risk Assessment Work Plan was delivered to EPA on November 20, 2009. On March 22, 2010 EPA provided a letter that noted the submittal was unsatisfactory. On June 16, 2010 Atlantic Richfield Company (ARC) provided a response to EPA's letter and requested that EPA resume review of the draft work plan. A September 9, 2010 conference call was held, and on December 15, 2010, ARC submitted a revised Baseline HHRA Work Plan.

EPA issued a conditional approval with comments and direction on March 10, 2011. On May 19, 2011, ARC provided a response to EPA's conditional approval. On July 6, 2011 EPA provided comments to ARC. Face to face meetings were held on February 10, 2014, October 2, 2014 and on October 6, 2014 among the topics discussed were outstanding HHRA issues, particularly on exposure scenarios and risk screening levels.

On January 21, 2015 EPA participated with ARC in a meeting hosted by the Washoe Tribe of Nevada and California. On March 23, 2015, EPA provided written comments to clarify and document necessary next steps for a Revised Human Health Risk Assessment Work Plan. On April 24, 2015, ARC provided a Revised Final Baseline Human Health Risk Assessment Work Plan, Revision 1. EPA provided comments dated October 13, 2015, and ARC responded to those

comments in a letter dated December 4, 2015. EPA provided additional line-by-line comments to questions that still remain outstanding in a letter dated January 12, 2016. EPA and stakeholders still had significant concerns on certain aspects of the risk assessment plan, specifically the trespasser and Native American exposure scenarios, as well as the *a priori* assumptions of remedies in place. EPA suggested two additional meetings to resolve any remaining issues and requested a final HHRA to be submitted by February 20, 2016.

A meeting between the EPA and Atlantic Richfield was held on January 19, 2016. Atlantic Richfield issued responses to EPA and LRWQCB comments on February 19, 2016.

A meeting between EPA and Atlantic Richfield was held on meeting on June 13, 2016.

On June 27, 2016 ARC provided revised versions of Tables 4.1 and 4.2 from the Baseline Human Health Risk Assessment Work Plan, Revision 1 (BHHRA Work Plan); finalizing ARC's responses to EPA comments dated October 13, 2015, and January 12, 2016,

EPA has completed its review of:

- ARC Response to EPA and LRWQCB Comments on the Final Baseline Human Health Risk Assessment Work Plan dated February 19, 2016; and
- Revised Tables 4.1 and 4.2 , dated June 27, 2016

and provides a line by line time sequence response in Attachment 1 and below. Attachment 1 includes comments that have been adequately responded to by ARC. Note that ARC should consider additional discussion provided by EPA in Attachment 1. Remaining comments include:

Specific Comments

- **S7: Comment #7 from the March 23, 2015 letter: Gantt Chart for Revised RI/FS Schedule and Annotated Table of Contents:** EPA requested an outline to include a paragraph under each heading and subheading to describe what information will be included in each section. And that both the ERA and HHRA risk assessments be completed in parallel, for inclusion in the final RIFS Report. **EPA Response:** ARC did not provide an updated Table of Contents and continues to argue that a reasonable sequence for completion of RI/FS, and risk assessment reporting, as set forth in the 2009 schedule, would require submission of the draft RI report approximately 15 months after completion of data collection (completion of data collection is projected for Q4 2016), followed by submittal of the draft HHRA and ERA reports approximately six months later, followed by the draft FS report six months after that. **EPA January 12, 2016 Response:** EPA disagrees. EPA has provided comments under a separate submittal and has set up a meeting on January 19, 2015. EPA feels its approach is reasonable, used at other sites such as the Anaconda Site (Yerington, Nevada), and consistent with the 2009 Proposed Work plan. **ARC February 19, 2016 Response:** U.S. EPA's comments on the RI/FS schedule have been noted and are being addressed in other discussions and related correspondence. The BHHRA Work Plan will not be modified to address this comment. A revised outline has not been provided. **EPA Response:** ARC shall provide an updated

schedule, and annotated table of contents, per EPA comments on the RIFS TOC Format, Reporting and Schedule which were provided under separate cover.

EPA has completed its review of the June 27, 2016 ARC revised versions of Tables 4.1 and 4.2 from the Baseline Human Health Risk Assessment Work Plan, Revision 1 (BHHRA Work Plan); and provides the following Additional Comments:

- EPA notes that the sediment ingestion rates may change depending on the extent of sediment contamination. The sediment and floodplain soil technical data summary report will be needed to determine this.

EPA provides the following Additional Comments:

- **Chemicals of Potential Concern (COPC):** EPA understands that the final COPC list considered data regarding organic compounds (e.g. PAHs, and PCBs) and uranium. These compounds, or any associated data gaps, should be addressed, at a minimum, in the uncertainties section of the risk assessment. Along with sound scientific rationale for why these are not included in the risk assessment.
- **Radiation Screening Survey:** EPA has reviewed and considered the Regional Board radiation survey document dated July 29, 2004. Although data seem to conclude that Naturally Occurring Radioactive Material (NORM) is likely not an issue at Leviathan; EPA requests ARC conduct a screening level survey to provide RI/FS data that can fully support that conclusion and include with scientific rationale for why it is not included in the risk assessment. This work should be completed in sufficient time for inclusion in a first Draft RI/FS December 31, 2017.
- **Figure 2 Assumption No.6** Please include and clarify why irrigation of plants for consumption excludes irrigation water from Bryant Creek.
- **Figure 2 Assumption No.7** This assumption appears to exclude plants sustained by groundwater, such as might be found at springs or seeps that are not adjacent to creeks. Current information suggests that such conditions exist. Please ensure the CSM includes plants that may be sustained by seep or groundwater until the pathway is considered incomplete.
- **Figure 2 Assumption No.8** Please clearly define and clarify the term "...in the vicinity of the ranch property".

EPA accepts the Human Health Risk Assessment workplan as outlined.

In the next 60 days, or by February 28, 2017 please provide a response to any remaining comments and provide the final revised Human Health Risk Assessment workplan. Please also fully consider and incorporate EPA comments on other documents, especially: Reference Area Workplan; RIFS TOC Format, Reporting and Schedule; and Draft Sections of the RIFS ("Technical data Summary Reports"). EPA provided those comments under separate cover. EPA directs ARC to ensure the risk assessments are sufficiently scheduled to ensure delivery of a first inclusive draft RI/FS by December 31, 2017 and a complete and final RI/FS by August 30, 2018.

If you have any questions, please feel free to contact me at (415) 947-4183 or Deschambault.lynda@epa.gov.

Sincerely,

A handwritten signature in cursive script that reads "Lynda Deschambault". The ink is dark and the signature is fluid, with the first name "Lynda" being more prominent than the last name.

Lynda Deschambault
Remedial Project Manager

Cc by electronic Email:

Douglas Carey, California Regional Water Quality Control Board, Lahontan Region
Lynelle Hartway, Washoe Tribe of Nevada and California
David Friedman, Nevada Department of Environmental Protection
Kenneth Maas, United States Forest Service
Tom Maurer, United States Fish and Wildlife Service
Toby McBride, United States Fish and Wildlife Service
Steve Hampton, California Department of Fish and Wildlife
Marc Lombardi, AMEC

Attachment I
Adequate Responses to Comments on the ARC Response to EPA and
LRWQCB Comments on the Final Baseline Human Health Risk Assessment
Work Plan, Remedial Investigation and Feasibility Study, Leviathan Mine
Site, Alpine County, California, Dated February 19, 2016
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- **EPA Comment dated October 13, 2015 G1 Decision Units:** EPA requested a description of the exposure units for conducting the risk assessment using full characterization and meaningful exposure point concentrations. **ARC Response:** ARC notes that as complete data sets become available for individual exposure media (e.g., mine waste, surface water), including reference data, data evaluation units will be defined and proposed to EPA. **EPA January 12, 2016 Response:** EPA disagrees, receptors have been defined for the human health risk assessment. ARC is directed to define exposure units, based on collected samples and proposed sample locations, which represent how the data will be grouped to calculate exposure point concentrations (EPCs). **ARC February 19, 2016 Response:** Exposure units will be defined in interim RI data submittals for each exposure media. For example, exposure units will be defined and EPCs estimated in the mine waste, groundwater surface, soil sediment/floodplain data evaluation report. **EPA Response:** EPA finds that the ARC response is adequate.
- **G2 Data Quality: Washoe Tribe of Nevada and California Exposure Scenarios:** EPA has clearly requested that the Washoe exposure assumptions and scenarios, and Reasonable Maximum Exposure (RME) estimated quantities be used to support the human health risk assessment, and that an iterative approach be taken to the Leviathan Mine risk assessment. **ARC Response:** ARC does not believe that the applicability of the RME to certain exposure scenarios or the timing for completion of the BHHRA and RI/FS report are reasonable, necessary, or consistent with U.S. EPA guidance or other applicable requirements. **EPA January 12, 2016 Response:** EPA disagrees; The ARC approach is not reasonably protective for an RME and remains inconsistent with basic EPA Risk Guidance. (1989 Risk Assessment Guidance for Superfund, Part A). EPA notes the RI is not considered complete without the risk assessment and both the BHHRA and Eco Risk can and should be completed now prior to collection of definitive reference data. Thus, the FS comparison with reference risks can be used to assess site based hazards and risks. **ARC February 19, 2016 Response:** The risk assessment will be accomplished in a two-step process (i.e., iterative risk assessment). As the first step, in the data summary report for each exposure media, a screening risk evaluation of the available data will be performed to assist with the identification of data gaps and to focus discussion of results on key chemicals that are considered risk drivers. Both human health and ecological screening criteria will be applied. For the human health risk screening evaluation and as directed by U.S. EPA, U.S. EPA's regional screening levels (RSLs) for residential site use and other applicable regulatory or site-specific criteria (e.g., maximum contaminant levels) will be compared to site data. In the absence of site-specific reference data, other available reference data will be used for this screening evaluation (e.g., USGS

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soil concentrations). The second step will be to perform the baseline human health and ecological risk assessments as described in the BHHRA and ERA work plans, which will incorporate the site-specific reference data. We concur that the RI will not be considered complete until baseline human health and ecological risk assessments are completed.

EPA Response: The ARC response is adequate. EPA understands that no RI/FS metals will be excluded from the BHHRA based on the results of interim screening within the summary reports. See EPA comments on Format, Reporting and Schedule under separate cover.

Specific Comments

- **S1: Comment #1 from the March 23, 2015 letter: Reasonable Maximum Exposure (RME):** EPA requested that the RME be used for an estimate of daily Quantity outlined in Table 1. For completing the Human Health Risk Assessment:
 - **Item 1:** EPA requested that the updated default exposure factors (OSWER, 6 February 2014) and updated the RME exposure scenario be used to support the BHHRA. **ARC Response:** ARC notes it is referenced. **EPA January 12, 2016 Response:** ARC included the reference citation but did not use default exposure factors. The most conservative exposure factor should be used when given more than one reference for a particular exposure factor or scenario. EPA directs ARC to apply the most conservative exposure factors for the RME risk evaluation in the BHHRA. **ARC February 19, 2016 Response:** Atlantic Richfield did not propose to change the exposure assumptions when the difference between the default and the proposed value was not significant. Atlantic Richfield will revise the exposure assumptions to be consistent with the more conservative exposure assumption will be used. The RME exposure assumptions for the Washoe Tribe will be applied to all areas of the site, and will not be limited to the Pine Nut Allotments. **EPA Response:** EPA finds that the ARC response is adequate.
 - **Item 2:** EPA requested the basis for the recommended exposure frequency of 7 days/year for the current trespasser. ARC refers to professional judgment as the basis for the exposure frequency, but it's not clear how the value was arrived at. **EPA January 12, 2016 Response** Please include the text presented in the response to comment as justification in the work plan for the 7 days/year exposure frequency **ARC February 19, 2016 Response:** Atlantic Richfield will add the text from Atlantic Richfield's December 4, 2015 Response to Comments to the discussion of the trespasser's exposure frequency in the BHHRA Work Plan text. This information also appears in Appendix B of the BHHRA Work Plan. The exposure frequency of 7 days per year will not change. **EPA Response:** EPA finds that the ARC response is adequate.

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- **Item 7:** EPA requested a more detailed explanation of the ingestion rate for the trespasser and recreational visitor receptors, and how the 50 per cent factor originated. **ARC Response:** ARC notes that they assumed that trespassers and recreational visitors would not ingest 100 percent of their daily intake from the site, but rather that 50 percent of the total was more reasonable, assuming that some food is brought to the area from other sources. **EPA January 12, 2016 Response:** EPA requests that ARC include and define how multiple modifiers, such as the 50 percent factor for site sources (Fa), will be combined in the risk assessment. **ARC February 19, 2016 Response:** In this case, the trespasser and recreational visitors are assumed to bring some of their own food and to supplement any food they forage and consume from the area. For the purpose of the exposure parameters, 50 percent is assumed to be consumed from foraging activities and 50% is brought from offsite. Separately, foraging activities may occur within the mine site and outside the mine site, which is intended to be reflected in the fraction from the study area parameter (Fa). At this point, all fractions from the study area are set to 100%, which will be evaluated further as the data summary reports for each media are developed. As an example, the RME scenario implicitly includes a fraction of area modifier of 71% for fish consumption to account for the size and relative abundance of fish in the study area (use of 142 grams/day compared to 200 grams/day). **EPA Response:** EPA concurs and finds that the ARC response is adequate.
- **Item 12:** EPA requested a PEF of 3.4E-06, (<http://www.atsdr.cdc.gov/HAC/pha/StandardMine051508/StandardMineHC050808.pdf>) as a better value to use for the recreational user. Also, since they won't be using an ATV 24 hours a day this higher value would not be used to evaluate the inhalation for 24 hours per day. **ARC Response:** ARC is suggesting that a less protective modeled PEF should be accepted for the four hours of ATV use in the BHHRA. **EPA January 12, 2016 Response:** EPA directs ARC to use the PEF of 3.4 E-06 to evaluate a separate 4 hour/day ATV rider. **ARC February 19, 2016 Response:** Atlantic Richfield will add a new receptor to the site conceptual model to address exposure by an ATV rider. The ATV rider will be exposed to soil for 4 hours per day and 1 day per week and the particulate emission factor will be 3.4x10⁻⁶ kg/m³ for those 4 hours. **EPA Response:** EPA finds that the ARC response is adequate.
- **Item 13:** EPA requested the basis for the 10% value for sediment ingestion for all receptors. It's not clear how it was determined or what it is 10% of. **ARC Response:** ARC notes that sediment and floodplain soil sampling are conducted separately at Leviathan Mine, and cites a Virginia Department of Environmental Quality guidance document as the basis for the 10percent value to "account for the decreased exposure to sediments". **EPA January 12, 2016 Response:** EPA disagrees. The 10% value is arbitrary, used for screening purposes and not

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reasonably protective. Use the soil ingestion rate as the sediment ingestion rate for the RME exposure scenario. **ARC February 19, 2016 Response:** Atlantic Richfield clarified the distinction between sediment and soil for this project. Sediment is defined as the material at the base of the creeks that is submerged for the majority of the time. Thus, contact with this sediment is likely to be low because it will be washed off by the surface water. Flood plain soil is the soil that is exposed above the water line the majority of the time and generally beyond the typical boundaries of the creeks. Soil ingestion and dermal contact with soil are intended to address contact with floodplain soil. Because floodplain soil and sediment exposure are assessed separately, Atlantic Richfield explained that assuming 100% soil exposure and 100% sediment exposure would be overestimating exposure by a factor of 2. **EPA Response:** EPA finds that the ARC response is adequate.

- **Item 14:** EPA requested a child receptor for the visitor and recreational scenarios. **EPA Response:** ARC notes that an adult trespasser scenario and recreational visitor scenario are assumed to be applicable to a 6-year-old through adulthood. Inclusion of young children from infancy to <6 years old for this receptor does not seem reasonable nor likely for this remote, mountainous area **EPA January 12, 2016 Response:** EPA disagrees. Not evaluating a child as part of the recreational scenario is not reasonably protective. EPA directs ARC to include a child recreational receptor in the risk assessment. **ARC February 19, 2016 Response:** Atlantic Richfield will include a child as part of the recreational exposure scenario. **EPA Response:** EPA finds that the ARC response is adequate.
- **S2: Comment #2 from the March 23, 2015 letter: Exposure Assumptions.** EPA requested that the foraging exposure assumptions utilize the Washoe RME assumptions as presented in Table 1. Atlantic Richfield has excluded the Washoe exposure parameters for the foraging receptor. **ARC Response:** ARC argues that they have been consistent in their position that the RME exposure assumptions are not applicable or appropriate to the foraging scenario (as opposed to the subsistence scenario). ARC argues that the foraging scenario applies to areas owned and controlled by the State of California and subsistence use by Washoe Tribal members will not occur. Therefore, the RME does not apply. **EPA January 12, 2016 Response:** EPA disagrees: Since 2009 EPA has directed ARC to use the Washoe RME for all tribal pathways. EPA has not changed its position on this matter and continues to direct ARC to use the Washoe RME as the basis for exposure for all tribal pathways in the BHHRA. Tribal receptors are not limited to foraging outside the described Pine Nut allotments. Please include the foraging scenario in the tribal risk assessment using the RME exposure factors. USEPA notes that evaluation of a tribal forager as well as a non-tribal forager is appropriate. **ARC February 19, 2016 Response:** Atlantic Richfield will apply the subsistence RME exposure assumptions throughout the Leviathan Mine Site to account for higher levels of exposure than currently identified for the Washoe Foraging Scenario. However, rather than add a new

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receptor, the areas where exposure may occur for the Subsistence Washoe Tribe Member receptor will be expanded beyond the Pine Nut Allotments to the entire Leviathan Mine Site. As discussed at the technical meeting on January 19, Atlantic Richfield plans to retain the Washoe Foraging Scenario as presented in the BHHRA to provide a more likely exposure under current conditions. **EPA Response:** Although Atlantic Richfield continues to maintain that tribal subsistence use is not a reasonably foreseeable land use for certain portions of the Site, including the Mine site and U.S. Forest Service; EPA notes that the subsistence RME exposure assumptions will be applied universally for purposes of assessing potential exposure and risk in the BHHRA, EPA finds that this is adequate.

- **S3: Comment #3 from the March 23, 2015 letter: Exposure Scenarios.** EPA directed that potential current receptors and potential future receptors must be applied to media as outlined in Figure 2 Human Health Site Conceptual Model (ARC Revised Baseline HHRA Work plan December 15, 2010) and utilizing the Washoe RME assumptions for the foraging receptors. **ARC Response:** ARC references its response to S2 and notes that it has requested a meeting with U.S. EPA. **EPA January 12, 2016 Response:** EPA and ARC met on February 10, 2014. At that meeting the EPA clearly stated its position, and directed ARC to use the Washoe RME for all tribal pathways. EPA has not changed its position on this matter, as discussed in the 10 February 2014 meeting, Tribal receptors are not limited to foraging outside the described Pine Nut allotments. ARC shall include the foraging scenario in the tribal risk assessment using the RME exposure factors. **ARC February 19, 2016 Response:** See response to S2 above which agrees to the use of subsistence RME exposure assumptions to assess potential exposure for foraging activities throughout the Leviathan Mine Site. Atlantic Richfield is evaluating these as future scenarios only since this level of exposure is not currently occurring. **EPA Response:** EPA finds that the ARC response is adequate.
- **S6: Comment #6 from the March 23, 2015 letter: Iterative Approach to the Risk Assessments:** EPA understands that the Residential Regional Screening Levels (Residential RSL) will be used for conducting a screening risk assessment for all areas and media as appropriate. **ARC Response:** ARC notes that residential RSLs will be used as a screening tool for the purpose of initial data evaluation. However, initial screening results will not determine the final results of the BHHRA or remedial decisions. **EPA January 12, 2016 Response:** There are currently no use restrictions on the properties evaluated during the RI/FS. Implementing land use restrictions or institutional controls will likely be evaluated in the Feasibility Study, and the residential screening evaluation will inform that remedial decision. EPA directs ARC to evaluate cumulative risks during the residential screen by summing hazard quotients to derive a hazard index. Also, ARC shall derive a cumulative cancer risk by summing the carcinogenic risk estimates for each COPC. **ARC February 19, 2016 Response:** At the technical meeting with U.S. EPA on January 19, 2016, Atlantic Richfield proposed to use the residential RSLs based on a

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target risk of 1×10^{-6} and a hazard index of 0.1 to address potential cumulative exposure to multiple chemicals. Using these values allows for up to 10 chemicals to be present at the screening level before a target risk of 1×10^{-5} or a hazard index of 1 is exceeded. This will allow the screening evaluation to remain a simple, straightforward comparison process that addresses the potential for cumulative exposure, but does not require adding across chemicals. Atlantic Richfield does not agree with U.S. EPA's statement that "there are currently no use restrictions on the properties evaluated during the RI/FS." The LRWQCB maintains site security at the Mine site, which is fenced and posted with no trespassing signs. Public access for recreational or residential use is thus prohibited. Use of adjacent U.S. Forest Service lands is governed by the Toiyabe National Forest Land and Resource Management Plan (USDA, 1986), which severely limits the issuance of special use permits for any new residential use within the National Forest. **EPA**

Response: Although there may be current physical or administrative barriers, it is important to clarify that there are currently no use institutionalized restrictions required through the CERCLA process (e.g., deed restrictions, dig restrictions, etc.). As noted, ARC will evaluate cumulative risks during the residential screen by summing hazard quotients to derive a hazard index. Also, ARC shall derive a cumulative cancer risk by summing the carcinogenic risk estimates for each COPC. **EPA Response:** EPA finds that the ARC response is adequate.

- **S8: Page 8, Section 1.4, first paragraph following bulleted section** – Lahontan Water Board comment as stated in a letter dated January 19, 2010, and provided, below:

Page 2, Section 1.1 Regulatory Guidance, last paragraph: "Additional guidance that addresses site specific issues and chemical constituents will also be consulted, including relevant guidance published by California's Environmental Protection Agency (Cal-EPA) through the Office Environmental Health Hazard Assessment (OEHHa) and the Department of Toxic Substance Control (DTSC)." The specific State guidance documents should also be cited in the text. It is also not clear what is meant by the text statement that these guidance documents will be "consulted". More specifically, consultation means compliance with their requirements.

ARC notes that specific references are provided in the text and tables for all guidance documents consulted during the preparation of the BHHRA work plan. ARC notes that EPA has directed ARC to use the value provided in the RME for the Washoe Tribal exposures (AESE, 2005). The Karl Ford, February 29, 2009 reference was provided to EPA to substantiate this assumption **EPA January 12, 2016 Response:** BLM does not currently support the Karl Ford guidance used and DTSC requests in their Comment 13 that ARC provide additional information to justify the soil ingestion values for the trespasser and recreational visitor. The reference from Karl Ford doesn't provide sufficient information to determine whether these soil ingestion values are appropriate for these receptors. After reviewing the Karl Ford memo, we repeat our original comment because the Karl Ford memo doesn't provide any information to back up this assumption.

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EPA contacted Karl Ford regarding rationale for the BLM exposure scenario. Dr. Ford replied with the following regarding the referenced document: "As you may know, I am retired from BLM and no longer support the document. With the advent of EPA's Risk Screening Table Values, state risk based criteria, and Ecological Soil Screening values, there is less need for this document." Thus, EPA directs ARC to select the most conservative exposure factors, given more than one reference for a particular exposure factor or scenario. Apply the most conservative exposure factors for the RME risk evaluation. The RME values should not be modified to reflect central tendency estimates prior to deriving a conservative estimate of risk to potential receptors. **ARC February 19, 2016 Response:** Atlantic Richfield will identify appropriate replacement values for the assumptions originally obtained from the Bureau of Land Management's Screening Level guidance for the recreational and trespasser scenarios. The most conservative assumptions that are reasonable for the exposure scenario will be proposed. For example, for dermal exposure, U.S. EPA does not recommend "that a high-end soil contact activity be used with a high end weighted AF [adherence factor] for that activity, as this use would not be consistent with the use of a reasonable maximum exposure (RME) scenario. Atlantic Richfield proposes to provide a tabular summary of exposure assumptions (Tables 4.1 and 4.2) for U.S. EPA to consider as a follow-up to this response. **EPA Response:** EPA finds that the ARC response is adequate.

- **S9: Page 8.** EPA requested that the statement "do not pose unacceptable risks to human health" be removed from the text. ARC notes The Revised BHHRA Work Plan is referencing conclusions drawn in a previous risk assessment prepared by Gradient Corporation and submitted to U.S. EPA in 2002. Noting that the conclusions from this previous risk assessment are accurately presented as general historical information for context in the Revised BHHRA Work Plan. **EPA January 12, 2016 Response:** Conclusions from a previous risk assessment that does not rely on current data should not be presented in the work plan since the conclusions do not inform the current plan. EPA directs ARC to remove this citation from the work plan and include in the RI/FS report as historical information. **ARC February 19, 2016 Response:** Atlantic Richfield will remove the conclusion, but will maintain the reference to the Gradient Corporation report in the discussion of previous risk evaluations in Section 1.5 of the BHHRA Work Plan. **EPA Response:** EPA finds that the ARC response is adequate.
- **S11: Page 8. Page 26, Section 3.2.3, second bullet** – EPA Requested that ARC clarify why it is assumed that this receptor will be at least 7 years old. Lahontan Water Board stated in a February 1, 2011 letter: Page 19, Current Recreational Visitor; page 21, Future Recreational Visitor. The planned risk assessment assumes exposure to persons seven years and older. It is likely that persons less than seven years old will be engaged in recreational activities in the area that could expose them to COPCs from the site. A more protective and realistic assessment would include children in the exposure scenario. ARC notes that "Inclusion of young children from infancy to <6 years old for this receptor does not seem reasonable nor likely for this remote, mountainous area. There are no

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nearby hiking trails, facilities, or campgrounds that would make the site a likely location for children less than 6 years old. Inclusion of a young child in the tribal exposure scenarios is adequately protective of these other receptors at young ages”. **EPA January 12, 2016 Response:** EPA directs ARC to include a child recreational receptor in the risk assessment. **ARC February 19, 2016 Response:** Atlantic Richfield will include a child receptor in the recreational exposure scenario. **EPA Response:** EPA finds that the ARC response is adequate.

- **S12: Pages 29, Section 3.2.4, second bullet** – EPA Requested that exposure scenarios relevant to the mine operations include groundwater wells. EPA comments regarding this topic go back to a letter dated January 19, 2010, and have yet to be addressed. ARC continues to argue that the mine site will not be available for unrestricted public use, including residential use, in the future. For this and other reasons, it is not reasonably foreseeable for a groundwater well to be installed at the Leviathan Mine site for the purpose of drinking water supplies. **EPA January 12, 2016 Response:** Both the EPA and the Water board considers it reasonable and necessary to look at on-site ground water as a source for drinking water. EPA considers this consistent with evaluating a potential residential exposure to evaluate the full array of alternatives in the Feasibility Study. EPA directs ARC to include a screening level drinking water evaluation in the risk assessment. **ARC February 19, 2016 Response:** Atlantic Richfield will add use of groundwater as a drinking water source for the RME scenarios for the Washoe Tribe Member for the on-property study areas. The recreational user and trespasser are assumed only to be exposed to surface water for the purpose of the BHHRA Work Plan. The RME scenario will consider water exposure in two ways – use of 100% groundwater or use of 100% surface water- but not both simultaneously. *See* prior responses to Comments S2 and S6 regarding current and future land use will include a child receptor in the recreational exposure scenario. **EPA Response:** EPA finds that the ARC response is adequate.
- **S13: Page 30, Section 3.2.5, third bullet** – EPA Requested that “Exposure to sediment and surface water in the irrigation ditches is not considered a significant exposure pathway... be verified during the assessment of this receptor, which may include collection of sediment samples from the ditch.” And requested information on how the assumption be would verified. ARC notes that analysis of samples of soil in the irrigation ditch by FPXRF indicated that concentrations of arsenic in the Bryant Creek ditch sediment were less than or equal to those in Cottonwood ditch sediment and that accumulated sediments were historically removed from the irrigation ditches to promote flow and hence are not believed to be a significant source of exposure above background levels requiring exposure assessment. **EPA January 12, 2016 Response:** Sediment samples from the irrigation ditch should be collected to verify the applicability of the McGinley and Associates data. Please conduct this sampling in spring 2016. Upland sediment sampling should be conducted at the same time. These two comments, below,

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from a Water Board comment letter dated February 1, 2011, related to the Current Off-Site Rancher have not been addressed:

Page 19, Current Off-Site Rancher; Figure 1; Figure 2; Figure 6; various tables; Appendix B-3. The extent of the Downstream Study Area is arbitrarily and inappropriately terminated at the junction of Bryant Creek and Barney Riley Creek. For the Off-Site Rancher, exposures from ingestion and dermal contact with surface water, ingestion of aquatic organisms and wildlife, ingestion of aquatic and terrestrial plants, and ingestion of and dermal contact with sediment are removed for consideration as a result. Bryant Creek, which is affected by the Leviathan Mine, flows through the River Ranch Property, and is a potential source of exposure for the Off-Site Rancher. The Off-Site Rancher is highly likely to have contact with surface water, sediment, aquatic organisms, and wildlife from Bryant Creek. Surface water, sediment, and other potential exposure media should be evaluated for potential risk to the Off-Site Rancher.

Page 23, Current Off-Site Rancher; Figure 2; Figure 6; various tables; Appendix B-3. The assumptions regarding exposure to surface water and aquatic organisms are based on water in irrigation diversion ditches. In addition to these features, Bryant Creek, which is affected by Leviathan Mine, flows through the River Ranch property, and is a potential source of exposure for the Off-Site Rancher. The Off-Site Rancher is highly likely to have contact with surface water, sediment, aquatic organisms and wildlife in or from Bryant Creek. Surface water, sediment, and other potential exposure media should be evaluated for potential risk to the Off-Site Rancher. Although the text indicates, "Other activities, such as ingestion of off-property plants and wildlife, are addressed by other receptors and are not included for this receptor," the cumulative effect of the potential exposures and associated risk to the Off-Site Rancher may not be represented by other receptors, as the Off-Site Rancher has unique potential exposures in addition to those of other receptors.

ARC's response stated "Other receptors, with more conservative exposure assumptions address exposure to the other media, including sediment, aquatic organisms, and wildlife from Bryant Creek." **EPA Response:** The off-site rancher has unique potential exposures and the cumulative effect for the rancher should be assessed. **ARC February 19, 2016 Response:** Subject to securing the necessary access, Atlantic Richfield will incorporate sampling of sediments from the irrigation ditches in the sampling plan for the River Ranch property for possible inclusion in the BHHRA. Sampling of sediments from upland catchment areas is currently planned for the 2016 field season. As requested, the rancher scenario will evaluate exposure to surface water, sediment, plants, fish, and wildlife. **EPA Response:** EPA finds that the ARC response is adequate.

- **S15: Page 35** Notes that a central tendency estimate (CTE) of risk will look at typical exposure only if RME requires action. The calculation of CTE risk is not required by the

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SOW and management decisions will use the RME risk estimates. ARC notes that based on this comment CTE calculations will not be presented in the BHHRA. **EPA January 12, 2016 Response:** USEPA notes that ARC is intending to use several central tendency

values during the baseline risk assessment evaluation in lieu of RME values. The RME should provide a conservative estimate of risks and hazards. Therefore, the BHHRA should be conducted using RME scenarios in accordance with the Exposure Factors Handbook (EFH 2011), and Risk Assessment Guidance for Superfund (RAGS), Washoe Tribe RME guidance, and California DTSC risk assessment guidance. A central tendency evaluation may be conducted after the BHHRA based on the RME, using conservative factors, to establish a potential range for risk estimates, but should not be combined.

ARC February 19, 2016 Response: In developing a RME scenario, it is important to consider that using the maximum exposure for all exposure assumptions “may be above the range of possible exposures.” (U.S. EPA, 1989, Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), December). “The intent of the RME is to estimate a conservative exposure case (i.e., well above the average) that is still within the range of possible exposures.” (U.S. EPA, 1989). The use of these values also needs to be evaluated when combining multiple exposure pathways to insure that an overall RME is being maintained.” (U.S. EPA, 2004, Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), July. Based on this U.S. EPA guidance and U.S. EPA’s comments to the BHHRA Work Plan, Tables 4.1 and 4.2 will be updated to present the revised exposure assumptions that are proposed for use in the BHHRA. **EPA Response:** EPA finds that the ARC response is adequate.

- **S16: Page 35** Use of a Fraction from study area (Fa) other than 100% must be vetted and agreed to by EPA and other stakeholders prior to the calculation of risk. ARC notes that the Fraction from Study Area (Fa) parameter will be determined based on site-specific factors and presented to US EPA at the time the exposure point concentrations are proposed. **EPA January 12, 2016 Response:** EPA strongly disagrees and directs ARC to use a Fa of 100 percent in the BHHRA. **ARC February 19, 2016 Response:** As discussed with U.S. EPA at the technical meeting on January 19, 2016, Atlantic Richfield will default to using 100% for the fraction from study area (Fa) for the BHHRA unless there is a compelling reason to use an alternative value that is approved by the U.S. EPA. **EPA Response:** EPA finds that the ARC response is adequate.

Below are the December, 2015 comments provided by the California Regional Water Quality Control Board—Lahontan Region (Regional Board) and ARC responses.

- **Comment 1:** The response provided in Table 1, Comment S8, page 7 of 10, does not address previous Water Board comments (January 19, 2010 Water Board letter and June 23, 2015 Water Board letter) regarding which regulatory requirements AR is complying with or just consulting. The Water Board acknowledges that there can be differences

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among California regulatory agency and U.S. EPA guidance documents and requirements. However, the Human Health Risk Assessment Work Plan still needs to include a statement that state requirements, such as the Water Board's Water Quality Control Plan for the Lahontan Region (Basin Plan), will be complied with, as required by CERCLA. **ARC February 19, 2016 Response:** Compliance with the Basin Plan will be addressed in the Applicable, Relevant and Appropriate Requirements portion of the Feasibility Study. As discussed at the technical meeting on January 19, 2016, and consistent with the designated beneficial use of groundwater at the site in the Basin Plan, groundwater use and consumption will be added to the site conceptual model. The Basin Plan will be cited in the BHHRA Work Plan as the basis for including this exposure pathway.

EPA finds that the ARC response adequately addresses LRWQCB's December 4, 2015 comment.

- **Comment 2:** The response provided in Table 1, Comment S12, page 8 of 10, does not adequately address previous Water Board comments (January 19, 2010 Water Board letter and June 23, 2015 Water Board letter) requesting inclusion within the Human Health Risk Assessment Work Plan, the scenario where a groundwater well is placed on the mine site at some time in the future. Nothing in Water Board staff comments referenced in AR's response or in any other Water Board staff comments precludes locating a groundwater well on the mine site or on surrounding properties in close proximity to the mine site. Doing so could create a complete exposure pathway for humans and needs to be evaluated in the Baseline Human Health Risk Assessment.

The Water Board continues to request the analysis of a potential on-site groundwater well and its corresponding complete exposure pathway in the Baseline Human Health Risk Assessment Work Plan. It is premature to believe that the future fate and uses of the mine site and of the surrounding property are clearly known, or known to the extent that the potential for locating a groundwater well at or near the mine site can be eliminated from such analysis. There have been numerous contaminated sites where involved and knowledgeable parties did not believe development creating complete exposure pathways would ever occur, only to see such sites developed with complete public access and corresponding exposure pathways within a number of years.

Additionally, the Baseline Human Health Risk Assessment must also recognize that the Basin Plan has designated beneficial uses and established corresponding water quality objectives for the groundwater underlying and surrounding the mine site.

The Basin Plan has designated the following beneficial uses for groundwater underlying and surrounding the mine site:

Municipal and Domestic Supply (MUN) Agricultural Supply (AGR)

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Industrial Service Supply (IND) Freshwater Replenishment (FRSH)

Additionally, the Basin Plan states, "... all waters are designated MUN unless they have been specifically exempted by the Regional Board through adoption of a Basin Plan amendment after consideration of substantial evidence to exempt such waters..." The Water Board has not taken such action for the groundwater underlying and surrounding the mine site, and doing so would also require approval by the State Water Resources Control Board.

The Water Board's position on this matter is supported by CERCLA Guidance, highlighting that compliance with state regulatory requirements are to be included and evaluated (Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, 1988).

ARC February 19, 2016 Response: As indicated in response to Comment 1 above, a hypothetical on-site groundwater well and domestic use of the groundwater will be added to the site conceptual model for the Subsistence Washoe Tribe Member. This exposure will be assessed separately from surface water since assuming 100% use of both simultaneously would over-represent water use.

EPA finds that the ARC response adequately addresses LRWQCB's December 4, 2015 comment.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX**

**75 Hawthorne Street
San Francisco, CA 94105**

December 29, 2015

Mr. Anthony R. Brown
Environmental Manager
Atlantic Richfield Company
4 Centerpointe Drive, LPR 4-435
La Palma, CA 90623-1066

Re: EPA comments on Atlantic Richfield's April 23, 2016 Mine Waste Technical Data Summary Report, Leviathan Mine Site, Alpine County, California

Dear Mr. Brown,

EPA has completed its review of Atlantic Richfield Company's (ARC) April 23, 2016 Mine Waste Technical Data Summary Report (TDSR), Leviathan Mine Site, Alpine County, California. This work is being performed pursuant to the Administrative Order for Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California (CERCLA Docket No. 2008-18, June 23, 2008).

Background:

This report summarizes the status of ongoing work completed under Amendment No. 6 to the August 10, 2010 On Property Focused Remedial Investigation Work Plan. ARC provided Phase 1 Amendment No. 6 on June 7, 2013. EPA issued a partial approval of Amendment No. 6 dated August 8, 2013 requesting continued analysis of material from each sample point via X-Ray Fluorescence. EPA also expressed concerns with the lack of spatial analysis, and lack of a relationship of decision units to human health and ecological risk assessment scenarios. Decision units and incremental sampling were subsequently abandoned by ARC in favor of discrete sampling, and spatial analysis has been undertaken by ARC.

EPA and ARC held discussions related to mine waste characterization on August 29, 2013, and February 10, 2014. Atlantic Richfield provided the Amendment No 6. Revision 1 to the On Property FRI work plan on June 4, 2014. The revision described a sampling approach based on results of earlier sampling conducted in a subset of the Overburden Area north of the Pit during 2012. On November 4, 2014 EPA provided an email request that Atlantic Richfield proceed with the Phase II Mine Waste Characterization field work, and to provide a formal response and an updated work plan to complete the site file records.

On November 28, 2014, ARC provided the Final Task Sampling and Analysis Plan for Phase 2 Mine Waste Characterization (TSAP). On April 3, 2015, EPA comments noted that the response addressed all but two of EPA's November 4, 2014 comments and clearly directed Atlantic Richfield to begin to compile data report summaries and interpretations to support completion of the remedial investigation and feasibility study (RIFS) at Leviathan Mine. EPA provided an outline and a due date of May 1, 2015.

ARC responded in a letter dated May 1, 2015:

- ARC agreed that a data evaluation report is needed to confirm that the data collection effort is sufficient for RI/FS purposes and satisfies the applicable DQOs.
- ARC asked for additional time to review and present the data. ARC stated they could not be ready with a report for the scheduled quarterly technical meeting in June. ARC suggested presenting the information at the next meeting in September. EPA requested a separate webinar be scheduled at the earliest convenience.

On August 18, 2015 ARC provided a webinar. EPA requested a copy of the slides and suggested an annotated outline for submittal of a mine waste data evaluation report. EPA also discussed the importance of keeping the risk assessments inclusive as part of the RI Report, and proposed a tentative time frame for preparation of the Mine Waste Data Evaluation.

On September 15, 2015 ARC transmitted the slides shared during the webinar, and included an annotated outline for mine waste technical memorandum, discussed separation of risk assessments from the RI Report, and proposed a tentative time frame for preparation of the Mine Waste Technical Memorandum.

On January 19, 2016 ARC and EPA held additional discussions of technical data deliverables such as the Mine Waste Technical Data Summary Report that are expected to become incorporated into the RI/FS report as appendices and provide the basis for RI/FS content. EPA was clear that the webinar presentation on August 8, 2015, and the subsequent deliverable were incomplete and did not address many of the April 3, 2015 comments.

On February 16, 2016 ARC requested an extension of the Mine Waste TDSR delivery date to April 16, 2016.

Beginning on April 3, 2015 EPA has requested a complete and robust technical report. ARC provided a revised Mine Waste TDSR on April 23, 2016. EPA has completed its review and provides the following remaining outstanding comments:

- **EPA previous comment S4: Section 4 Mine Waste Characterization Methods and Results:** Please explicitly link the decision statements defined by the DQOs during the planning process to the investigation methods that were used. Please include a full discussion on meeting the DQO's. For example, describe what data gaps the Aerial Photography and Mapping address and what data gaps the Borehole Sampling and Analysis address. Please provide a table to summarize and simplify a comparison to DQOs. **ARC February 16, 2016 Response:** ARC stated that information would be added to Sections 4.0 and 7.0 of the report to address this comment. **EPA Comment:** The requested information is provided but is not explicitly linked as requested in EPA's comment. EPA directs ARC to provide the requested text describing in detail how the RI data address the DQOs.
- **EPA previous comment S5: Section 6 Evaluation of the Nature and Extent of Contamination:** The annotation for Section 6 ends with an emphasis on use of data to illustrate the extent of mine waste. While the extent of mine waste is of interest, of equal interest is the extent of the chemicals of concern that originate in mine waste. Please ensure that a section of the mine waste report identifies the extent of the chemicals of concern that originate from mine waste. **ARC February 16, 2016 Response:** ARC committed to address this request within Section 6.0 of the TDSR with the caveat that 'all hazardous substances originating from mine waste in all locations... have come to be located' was not the intent of

EPA's comment. **EPA Comment:** Many of the metals results that exceed benchmarks or proxy reference concentrations are not bounded laterally and sampling was based on visual evidence of overburden. EPA directs ARC to provide a discussion of lateral extent of contamination and how this will be addressed in the Feasibility Study and/or during remedial investigation/design. If additional data gap sampling is necessary, this should occur during the 2017 field season.

EPA provides the following new general and specific comments.

General Comments

- **G1: Section 3.0 Summary of previous investigations and abatement measures:** The summaries are general in nature and do not provide sufficient summary of available analytical data for mine waste. Please ensure that associated analytical data are summarized in tables to support comparison with information gathered during ARC's RI field efforts. It is important that ARC provide context for the RI data, evaluate site conditions through time, and provide support for decision making.
- **G2: Section 4.1.3 Secondary Sources and Pathways:** Please provide additional detail and discussion on the relationships of the secondary sources and pathways to mine waste. Mine waste is mentioned in the text; however, the focus of the text appears to be on each of the respective pathways. The text needs to be revised to state more clearly how the mine waste is related to the pathways.
- **G3: Section 5.3, Data Quality Assessment (DQA) Incomplete:** Please revise to ensure proper organization and documentation of the actual steps of the DQA as per the approved 2016 RI/FS QAPP. The QAPP, Section 6.1, clearly references EPA's Data Quality Assessment: A Reviewer's Guide EPA QA/G-9R, dated February 2006. It defines the 5 steps for performing a DQA:
 1. review project objectives and sampling design
 2. conduct preliminary data review
 3. select statistical method
 4. verify assumptions of the method
 5. draw conclusions from the data.

However, ARC's Section 5.3 of the Mine Waste Report references the 1992 EPA document, Guidance for Data Usability in Risk Assessment, which includes a different set of criteria.

The data quality review is not complete. Additional general and specific comments on the Mine Waste TDSR DQA are provided in Attachment 1 to these comments.

In particular, the TDSR does not show how the DQA and DQO processes correlate. ARC must ensure compliance with EPA guidance, and provide a clear DQO process that includes a sampling design that collects the right type, quality, and quantity of data for the intended use. Please provide revised DQA text statements to clearly support the adequacy and sufficiency of the data set to support the risk assessments and RI/FS decision making. Please ensure that the DQA process evaluates whether the objectives in the DQO planning phase have been achieved and are supported by data of adequate quality.

- **G4: Non-Conservative Screening.** In many instances ARC used the maximum proxy reference metal concentration to screen the mine waste data sets. This results in a non-conservative comparison because

there is no way to determine if an outlier is responsible for the selected screening value. Please estimate the median and/or mean concentration proxy reference concentration for each metal and provide comparison to median and/or mean site concentrations. These will likely be more similar to the calculated exposure point concentrations (EPC's) developed in Section 8 of the report, to represent an upper confidence limit on the mean concentration. Additional details are provided in the specific comments below

- **G5: Lack of Documentation to Support Statistical Analyses:** ARC must ensure that statistical analysis is clearly documented and presented. ARC's attempts to confirm statistical analyses through reference to appendices is not sufficient. In some cases, the appendix is overly general and does not clearly show how or whether the information supports the text (i.e. the geostatistical cross validation). The statistical power analysis (Section 5.4.6 and 6.2.1.4) is not included in an appendix and the findings are not reproducible using the methods described in the text. Please ensure that proper statistical analysis is provided to support the report conclusions. Additional details are provided in the specific comments below.
- **G6: Link Enabled Table of Contents:** All future TSDR reports must ensure the pdf have go to links enabled in the Table of Contents and text for Sections Table and Figure. This will make the 800 plus pages of report easier for the reviewer. Check out this link for direction <http://blogs.adobe.com/acrolaw/2011/03/ensuring-that-word-tocs-create-hyperlinks-in-acrobat/>

Specific Comments

- **S1: Page ES-6: Conclusions Bullet 3:** Please update reference comparisons with RI reference data as available.
- **S2: Section 4.1.3.2 Surface Water, third paragraph:** The text refers to an 'acidic pond discussed above', however a review of the preceding text did not find such a discussion. The relationship of the beaver pond discussion to the mine waste should be explicitly stated so that the discussion becomes relevant to the memorandum. Alternatively, this paragraph could be deleted with no loss of clarity in the document.
- **S3: Section 4.1.3.2 Surface Water, fourth paragraph:** This paragraph introduces the topics of storm water runoff and snowmelt. However, the discussion remains general in that runoff interactions with mine waste is not clear. Please revise the text to focus on the interactions of mine waste and storm water, and mine waste and snow melt.
- **S4: Section 4.3.4 Step 4 Define Boundaries, Target Population:** Typically the upper 10 feet is evaluated for a residential receptor. Please revise the text to include the upper 10 feet or indicate that the calculated EPCs are conservatively estimated to reflect the 10-foot interval.
- **S5: Section 5.4.1 Exploratory Data Analysis:** The current discussion does not offer explanation concerning the analyses being used for the cross validation assessment. In Appendix 5-F the results of cross validation are presented in raw form. Please provide a more complete description of the analyses used in cross validation statistics, and include more explicit indication of what is being presented and the results of the cross validation. The text should include discussion of the results and concerns of the cross validation statistics and implications for geostatistical models.

- **S6: Section 6.1 Location, Extent, and Volume of Mine Waste, first paragraph:** The text notes that in situ rock exposed by excavation of the open pit was evaluated as mine waste. It is not clear from subsequent discussion how this evaluation affected the estimation of mine waste volume. Please revise the text to identify the volume of in situ rock exposed in the pit and considered as mine waste, and to separately identify the volume of mine waste resulting from movement of materials during mining.
- **S7: Figure 5-1:** The area disturbed to create the miners housing north of the Aspen Seep area is not identified as mine waste. The ground surface was disturbed and geologic materials were significantly redistributed in this area during mining. Please include this area in any estimate of the mine waste, revise Figure 5-1, and ensure that the estimated volume of mine waste includes this material.
- **S8: Figure 6-1:** The figure is not very useful. Labeling some site features would be helpful, however, the scale of the presented figure does not support its intended use. Please show separate areas (such as the overburden area, and the upper pond area, and the Delta Slope area, and the Pit) at a scale permitting discernment of relevant features (such as the bottom of the mine waste, surface of mine waste, roads, ponds, and topography).
- **S9: Section 6.2.1.3 Phase 2 Multivariate Principal Component Analysis Results:** ARC does not provide a comprehensive summary of the data used for the assessment. Please list the variables used to form the principle components. In addition, please provide the variance of F1 and F2 on the accompanying graphs. EPA also notes and requests explanation for the presence of beryllium twice on the graphs. Please revise Paragraph 2 in Section 6.2.1.3 to discuss the PCA groupings in more depth and add text to discuss what the results appear to indicate about the data. The text currently offers broad assessment with no discussion of relevance to the site.
- **S10: Section 6.2.1 Surficial Sampling Results:** This section discusses results from statistical analyses individually. While this is necessary, please also include an additional subsection (i.e. Section 6.2.1.5) that summarizes the individual statistical results in context with other statistical evaluations.
- **S11: Section 6.2.1.4 Preliminary Statistical Power Assessment Results:** The text here requires significant revision. The text does not identify the method(s) used to complete the power analysis, does not identify software used or refer to such a description, and no example figures or explanatory text are provided. The text simply states that the power analysis showed that a sufficient number of samples were collected. The information provided in Section 5.4.6 does not meet these requirements. Attempts to use ProUCL software and the data set provided with the TDSR met with ambiguous results that were not consistent with the existing text. ARC should use ProUCL or other statistical analysis program. At a minimum the text needs to be augmented with a description of how the analysis was completed, a summary table that identifies the inputs used to conduct the power analysis, and representative graphs providing examples of the analysis.
- **S12: Section 6.3 and Table 8-12. Evaluation of Grain Size on Metal Concentrations.** EPA notes the total number of 24 samples are from actually from 14 locations. And these 14 locations are to represent 230 acres of mine waste. The statistical evaluation and resulting conclusions may not represent the actual enrichment factors. Please add text to discuss this limitation in the uncertainty section of the baseline risk assessment. EPA also notes new guidance July 1, 2016: *Recommendations for Sieving Soil and Dust Samples at Lead Sites for Assessment of Incidental Ingestion*. The memo

recommends moving from the current < 250 µm particle size to < 150 µm particle size. The recommendation is based upon an expanding body of evidence illustrating that dermally adhered soil is dominated by particle fractions < 150 µm. Please consider this in the preparation of the risk assessment.

- **S13: Section 6.4.1.1 Macronutrients:** The discussion of Phosphorus states that the phosphorous measurements in mine waste samples could be misleading. The text should be revised to give an idea of how the results are misleading and state whether the phosphorous concentrations in mine waste are likely biased high or low.
- **S14: Section 6.4.2.2 Neutralization Potential :** The current discussion is misleading and should be revised to accurately reflect the available information. The text improperly quotes the results of Herbst and Sciacca (1982). Herbst and Sciacca observed calcite “along joint faces in the biotite pyroxene hornblende andesite, coating pebbles in the sedimentary unit cut by a fault on the west edge of the pit, and along plant roots in soil developed on sandstone”. These descriptions are of in-place material not the contents of the waste rock and overburden piles. This text should be removed from the description and the discussion should be focused on the neutralization potential of the mine waste (waste rock and overburden).
- **S15: Section 6.4.2.3 Sulfur Analyses:** The discussion implies that there may be an increase in sulfide sulfur with depth (decrease in sulfate sulfur with depth). However, the information is presented without differentiation of shallow and deeper samples. This general presentation may mask an important characteristic of the mine waste piles (i.e. presence of an oxidized ‘rind’). Please revise the text to show whether or not there is a variation of sulfide sulfur and/or sulfate sulfur with depth.
- **S16: Section 7.1 Reconciliation with DQOs, last paragraph :** The text includes description of proxy levels as being the higher of two values, risk based screening levels and the maximum value from the proxy reference data set. Using the maximum concentration from the proxy reference data set is likely to result in a non-conservative screening result. This is because there may be outliers in the proxy data set or other factors that make the maximum value inappropriate for use in risk screening. Estimating the median and/or mean value of the proxy reference data set would be a simple exercise and result in a more conservative screen. EPA directs ARC to explain how selecting the maximum proxy reference concentration will avoid using outlier values as a screening tool; and to assess other factors that may impact use of the proxy reference values for screening. EPA also requests that the median and/or mean proxy reference concentrations be estimated for comparison with the site data.
- **S17: Table 7-1:** The text in Section 7.1 states that Table 1 provides a column that indicates what data gaps were addressed by each data collection activity. However, this column is not provided in Table 7-1. Please revise to include this column.
- **S18: Section 8.1 Risk Assessment Data Set:** The third bullet states that samples from 2 to 6 feet bgs are collected to assess risks to burrowing mammals. EPA notes that these data may also be used to assess risk to future construction workers at the site.
- **S19: Table 8-1:** This table compares only the minimum and maximum values detected to risk based screening benchmarks. As is, the table provides screening based on comparison of maximum concentrations from only one sample, resulting in a skewed perspective of the data. Please revise to also include the median and/or mean detected concentration for each metal, and provide the human health and ecological exposure point concentrations for comparison with the screening levels for each

metal.

- **S20: Section 8.2.2 Proxy Reference Area Concentrations:** The text states that the maximum proxy reference concentration from among six different proxy data sets was selected as a proxy reference comparison value. This is not a conservative approach to consideration of the proxy reference data. As is, a single outlier could significantly affect these comparisons. EPA directs ARC to estimate the median and/or mean concentration for each of the proxy reference metals and to include comparison of the median and/or mean proxy reference concentration for each metal with the site metal concentrations.
- **S21: Table 8-4:** The table provides an incomplete summary of proxy reference information. EPA directs ARC to complete the table by providing the median and/or mean metal concentrations for each of the proxy data sets, and the overall median and/or mean of the combined proxy data sets. This will provide for a more robust comparison with site data, and with the future Leviathan Mine reference data set.
- **S22: Human Health Comparison to Screening Levels:** The comparison is limited to the maximum detected concentration of each of the metals with screening benchmarks. This is overly conservative. EPA directs ARC to also include comparison of the median and/or mean detected concentration and estimated EPC of each of the metals with screening benchmarks.
- **S23: Table 8-5:** The table identifies a concentration used for screening. The footnote states that the maximum concentration was used for screening purposes. Use of the maximum concentration is very conservative. In addition to the maximum concentrations, EPA directs ARC to also compare the median and/or mean concentration for each metal to the screening benchmarks, and to include the EPCs for comparison as well.
- **S24: Section 8.2.3.3 Proxy Reference Concentrations and Table 8-8:** As-is the table combines overly conservative (through use of maximum detected values from the site) with non-conservative (through use of maximum proxy reference values) comparisons. This appears to lead to ambiguous screening results. For example, metals not detected in the proxy reference data and detected in site samples are not shown as exceeding the proxy reference values (for example chromium and silver). Further, for those metals such as cobalt, with maximum site concentrations less than the maximum proxy reference concentration, there is no way to determine if this is an effect of outliers in the data sets. EPA directs ARC to include the median and/or mean concentrations for each metal in the table for comparison, and to revise the text to reflect comparison of the median and/or mean concentrations in addition to the use of maximum concentrations.
- **S25: Section 8.3 Identification of Chemicals of Potential Concern:** The text notes that “Although the maximum concentration of several metals was below the proxy reference concentration, these criteria will be re-evaluated once the complete reference data set is available”. This non-conservative conclusion was formed through use of the maximum detected concentrations from the proxy reference data to conduct screening. Unfortunately, there is no way to determine if outlier values have skewed the comparison using the information as presented. Therefore, EPA directs ARC to include the median and/or mean concentrations for site and proxy reference metals data in these comparisons and to revise all associated text accordingly.
- **S26: Section 8.3.1 Human Health Risk Assessment:** the text should be revised with respect to an y

conclusions related to screening as noted in comment S22 above. In addition, the last sentence states that “If these metals are present below reference concentrations then they will not be considered COPCs in the BHHRA”. EPA has consistently stated that reference comparisons will not result in removal of chemicals from consideration in the risk assessment. All metals will be retained in the risk assessment and cumulative site risks will be determined to support decision making.

- **S27: Section 8.4.1.1 Human Health Receptors and Exposure Pathways:** The text presumes that the presence of the existing fence at the site limits human exposure to site trespassers. This is not a permanent remedy under CERCLA. Also, this presumption does not consider the disturbed area location outside of the fenced area north of the Aspen Seep area. This area was graded during mining to provide access for exploration drilling, and to provide housing for contract miners employed at the site. Currently there is no restriction on human access to this area. The text should be revised as necessary to address unrestricted access to this area.
- **S28: Section 8.4.3.1 Human Health Receptors (third paragraph on Page 83):** The text states that a hot spot analysis would occur if the mine waste does not pose an unacceptable risk (human or ecological). Please provide a graphical analysis of the outliers should to determine if hot spots are present (regardless of the overall risk) to ensure that some limited area of the mine waste does not pose a risk. Please complete and provide a hot spot evaluation.
- **S29: Conclusions:** The second paragraph begins with a statement that “Based on the evaluation of mine waste investigation data provided herein, the RI/FS data adequately characterize the mine waste materials for the purpose of the RI, human and ecological risk assessments, and the FS.” This statement indicates that data quality and objectives have been met such that the risk assessment for Mine Waste can be completed. EPA requests completion of the baseline risk assessment for mine waste. Please develop concurrent with the remaining media specific reports, to ensure delivery of inclusive draft RI/FS by December 31, 2017 and a complete and final RI/FS by August 30, 2018.
- **S30: Conclusions Page 86, Third Bullet:** The bullet describes special associations of two metal groups. The associations are referred to as having local or short range vs regional or long range scales of spatial variation. Please ensure that the scale of variation is described in terms of measurable lengths.
- **S31: Conclusions Page 87, Fourth Bullet:** The bullet text discusses proxy reference concentrations and identifies metals that were below the proxy reference concentrations. As described in comments above, the proxy reference concentrations were not selected appropriately. The maximum detected concentration of each metal was chosen as the proxy reference concentration. The comparison with proxy reference concentrations should be reevaluated using the median and/or mean proxy metal concentrations.

The bullet text also suggests that if reference and site concentrations are similar, that the metal may not be site related. This is an inaccurate statement. A more accurate statement is that site and proxy risks are expected to be similar for those metals with similar site and proxy reference concentrations. Please revise the text accordingly.

- **S32: Conclusions Page 87, Fifth Bullet:** Please ensure that use of the maximum concentration for screening is augmented with median and/or mean concentration, or a specified upper confidence limit on the mean. This will allow a more complete understanding of the data set and prevent overlying

conservative reactions to the data. Use of the maximum detected concentration may result in unnecessary attention to an outlier or other non-representative data point. Please ensure the screening comparisons are expanded to include the median and/or mean concentration.

- **S33: Conclusions Page 88, Second Bullet:** The last sentence refers to the ‘entire mine waste pile’. The text should be changed to read ‘entire mine waste area’.
- **S34: Recommendations:** The recommendations do not refer to the feasibility study. Please include a discussion of the feasibility study and include identification of preliminary remedial action objectives and preliminary remedial action goals for mine waste at Leviathan Mine.

EPA attaches a copy of comments from the Lahontan Regional Water Quality Control Board dated November 10, 2016 and directs ARC to provide line by line responses to each of the comments, including:

1. **General comments** – How will data gaps related to Isbell Camp be addressed?
2. **General comments** – How will hot spots be addressed in this work plan for certain areas that have considerably higher concentrations than the mine waste in general? Hot spots with potential public access should be addressed separately per CERCLA guidance. The area near the Isbell Camp area that had a concentration of arsenic of 5526 mg/kg should be investigated as a hot spot. Why were the areas that had the highest arsenic concentrations from Phase 1 sampling not revisited during Phase 2 sampling?
3. **Page 16, Section 4.1.2.1, first full paragraph on page, second to last sentence** – It is unclear what the term “mechanically derived sediment in surface water” means. Please clarify.
4. **Page 56, Section 6.2.1.3** – The linkage between metals groupings and the importance related to the Principal Component Analysis is missing in this section. It is unclear what the difference from the left-hand and right-hand side of the correlation circles represents and how the scales of spatial variation were determined. Please clarify.
6. **Page 67, Section 6.4.1.7, entire section, and Page 87, Section 9, first bullet on page** – The first paragraph of Section 6.4.1.7 discusses that there are previous studies documenting aluminum concentrations that could limit plant growth. Later in the third paragraph of this section, there is a statement that concentrations from borehole data indicate 11 metals have the potential to be phytotoxic, which includes aluminum. However, in Section 9, the bullet summarizes that “there appears to be no specific micro-nutrient metal concentrations that might cause phytotoxic effects on revegetation efforts at the site” and there is no mention of aluminum. It is unclear what is supporting this conclusion in light of the previous statements, and the conclusion could be misleading. Please clarify.
7. **Page 82, Section 8.4.2.1** – Please explain the basis for the conclusion that human receptors could not be exposed to the maximum concentration of all COPCs and the assumption that they would be exposed to average conditions throughout. Does this mean that there are no instances where a human receptor could be exposed to a maximum concentration of COPCs?
9. **Page 83, Section 8.4.3.1, second paragraph and Table 8-13** – It appears that an evaluation was conducted on the ten highest concentrations of each metal to determine if they could be considered outliers. For seven metals it was determined that the top 10 concentrations were outliers of which some outliers were 10 times the representative concentration. Please explain how these higher concentrations were determined to be outliers versus hot spots. This data should be carefully evaluated to ensure that valid high concentration data points are not inadvertently removed. Are the same 10 outliers identified

for the seven metals from the same sample locations? The sample locations for these potential outliers should be identified and illustrated in this document.

10. **Page 83, Section 8.4.3.1, third paragraph** – Why is further analysis only recommended for hot spot areas if the risk analysis does not indicate potential human health risks greater than acceptable levels? There are areas that appeared to be hot spots during Phase 1 sampling that were not sampled during Phase 2. If these areas are more likely to be accessed by humans, it may be appropriate or necessary to conduct additional hot spot sampling to evaluate exposure separately for certain areas. Please explain the basis for this determination.
11. **Appendix 5-C, Appendix 5-F, and Appendix 5-G** – It appears that there is missing information in these appendices. The variograms do not include what metal is being modeled, there are no descriptions to assist the reader in understanding what is being shown (such as in Appendix 6-A, page 534 of 803 or slide 31 of October 2, 2014 presentation), and there are no ranges specified on any of the variograms.
12. **Appendix 5-H** – It appears that there is missing information in this appendix. It is not clear what metal is displayed in the cross validation plots and the information that is being displayed is not defined in a manner to understand the importance of this analysis.

EPA also attaches a copy of comments from the Washoe Tribe of Nevada and California, dated November 1, 2016 and directs ARC to provide line by line responses to each of the comments, including:

- **General Comment 1:** The Tribe concurs with BP's overall recommendation:
Based on the evaluation of the mine waste investigation results described in this report, no additional characterization activities are recommended to satisfy the requirements of the RI. (Page 89)
The Tribe generally agrees with the conclusions that the wastes are essentially homogeneously heterogeneous and will need to be addressed via remedial action. Regardless, except for understanding the concentrations of COC in soils associated with the "halo", our comments do not support more sampling on-site.
- **General Comment 6:** The document includes a large amount of technical calculations that cannot be easily evaluated or reproduced without the supporting spreadsheets. Please provide the supporting spreadsheets and digitally stored data.
- **Specific comment: Page ES-2; 3. DATA EVALUATION FOR RISK ASSESSMENT:** A risk assessment data set for mine waste was compiled for comparison to human health and ecological risk-based screening levels and proxy reference concentrations to assess potential impacts associated with exposures to mine waste at the Leviathan Mine Site. Exposure scenarios, receptors, and data evaluation units (exposure areas) were identified for the purpose of developing exposure point concentrations for use in the human health and ecological risk assessments. Screens are supposed (sic) to be designed to provide conservative estimates. The Screening criteria described here are not conservative and do not provide nearly the requisite protection for members of the Tribe or the General Public. See General Comment No.3.
- **Specific comment 3: Page ES-4, First full paragraph, last sentence :** Data usability assessments indicated that mine waste investigation data meet the requirements of the DQOs developed during planning of mine waste investigations. Clearly the data do not meet the data usability requirements following EPA 1992 approach; however, as described in General Comment No. 1, PR B will be the

basis of the remedial action objective (or preliminary remediation goal)— risk will not be the cleanup driver. However, if COCs sampled in purported “reference areas” are biased-high, and approach those concentrations observed for the Site, statistical discrimination between Site materials and PRB could require fairly extensive sampling.

- **Specific comment 4: Page ES-4, First full paragraph, last bullet:**

- Based on visual examination of spatial distribution maps, the distribution of RI/FS metals across the mine waste is highly variable resulting in considerable heterogeneity in RI/FS metals concentrations are not consistent among all the metals and change significantly within hundreds of feet. As a result, spatial trends in RI/FS metals concentrations are not apparent and were evaluated using geostatistical techniques to assess possible spatial relationships. The heterogeneity in RI/FS metal concentrations within mine waste materials is consistent with the random distribution of mine waste associated with the reported lack of coordinated plan for the placement of overburden and waste rock during mining activities.

Throughout the document, BP essentially conclude that the subset of TAL metals measured in waste piles are so inter-mixed that they can be considered nearly homogeneously-heterogeneous over the scale of the Mined Area (MA), which is consistent with our interpretations provided in General Comment 1. However, BP also concludes that a subgroup of COCs is associated with longer, more regional range (second bullet, below).

- Evaluation of spatial associations between various metals in mine waste samples suggests the presence of two groupings of metals. The first group includes aluminum, beryllium, cobalt, manganese, nickel, and zinc. This group of metals tends to be associated with local scales of spatial variation – or short-range spatial variations in metal distributions. The second group consists of antimony, arsenic, barium, lead, mercury, lead, selenium, and, silver. This group of metals tends to associate with regional scales of spatial variation – or long-range spatial variations in metal distributions.

The Tribe is concerned that BP will attempt to ascribe the apparent spatial co-variance observed for this group to regional background. This conclusion is hard to believe especially since the degree of mechanical mixing that has occurred via mining and waste rock/overburden placement.

- **Specific comment Page ES-6, bullet 2:** Concentrations of metals were different in the fine soil fraction (less than 0.25 millimeter [mm]) compared to the concentrations in bulk samples, which includes both the fine and coarse fractions. Because human receptors are more likely to be exposed to the fine fraction of soil particles which are more likely to adhere to the skin or be resuspended in air, the 95% upper confidence limits (UCLs) to be used for human health risk calculations were adjusted to represent fine fraction concentrations based on chemical-specific regressions. The Tribe generally agrees with this approach; however, 250um is likely too large. For human ingestion, the less than 62 um is the sand/silt cutoff on the Wentworth grain size classification scale. This size fraction is more easily consumed unknowingly by the receptor. The 250um is sand sized and even children are like to reject food containing soil of this size fraction. See also EPA comment S12 above.
- **Specific comment 7: Page ES-6, bullet 4:** Maximum concentrations of 16 RI/FS metals in soil 0 to 2 feet bgs exceed human health screening levels (HHS Ls) for residential site use. The maximum concentration of chromium, nickel, silver, and zinc were below the human health screening levels for residential site use. BP cannot screen out any COC at this time. Residential HHS Ls are determined for a single COC, single pathway, originating from a single medium. In this case soil to the exclusion of

risk from ingestion of Surfacewater or Groundwater.

- **Specific comment 9: Page ES-6, bullet 6:** Potential human exposure to mine waste is anticipated to occur over a large area which is not limited by fences, property boundaries, or structures. Metals concentrations vary by metal throughout the mine waste area with some metals higher in one area and other metals higher in another area. A human receptor could not be exposed to the higher concentrations of one metal in one area and higher concentrations of another metal in another area simultaneously. Rather they are considered to move throughout the mine waste area so over time they are exposed to average conditions throughout. As a result, the mine waste area is considered a single exposure area for residential receptors and exposure point concentrations (EPCs) were developed for the entire mine waste pile. Perhaps, but like ecological receptors, Tribal citizens will spend more time in specific area than another depending on whether they are hunting, fishing, gathering, or just residing....
- **Specific comment 11: Entire Section 2.0 Geology** BP spends a lot of time on the regional geology, but just skims over the site-specific geology. Site-scale geology should be the focus for the site characterization report.
- **Specific comment 20: Page 31; Section INFORMATION GATHERING AND INTERPRETATION** Atlantic Richfield's mine waste investigation data collection program consisted of extent and texture mapping, discrete soil sampling from boreholes, and discrete and composite sampling from shallow hand dug locations. The discrete and composite samples likely have different scales of geostatistical support and should not necessarily be treated as similar specimens unless it can be shown that support is similar. Please provide this analysis.
- **Specific comment 21: Page 31; Section 5.1.1 Methods; first sentence** Extent mapping was conducted by walking select areas of the mine waste and making notations of the extent of mine waste on field maps. The "extent" described above appears to be the visual extent of contamination. The buffer or halo surrounding the edge of these piles where COCs have been released and transported away from the visual extent is likely much larger and will need to be considered during the FS.
- **Specific comment 26: Page 40-41 entire section 5.2.3.2 Sample Analysis;** The Tribe has always been a proponent of sieving solid samples prior to analyses for the following reasons:
 1. the thermodynamic effective concentration (TEC) of COCs are in part a function of the exposed surface area of the solid of study. The surface area available for chemical reaction is a function of the grain-size. Therefore, chemically analyzing samples that have been sieved better approximate the concentrations that are available to do chemical work.
 2. The 250 um is still too large. 62 um is preferred (See Specific comment 5), and
 3. 250um will be required to run the IEUBK mode for risk from Pb.
See Also EPA comment S12 above.

From the statement: *The fine fraction was analyzed for RI/FS metals. Depending on the sample material, for some samples there was insufficient sample volume to run both bulk and the fine-fraction analyses.* It is clear that field samplers were targeting coarser materials (since not enough fines to do fines and coarser). This approach will not be helpful in the future when sampling occurs in the halo area as well as downstream from the MA.

- **Specific comment 27: Page 42 section 5.3.2 Documentation; last bullet:** Mercury and hexavalent

chromium were not analyzed in 23 additional bulk mine waste samples because insufficient soil was available for both bulk and fine fraction (grain size less than 0.25 mm) was required for analyses. Almost 300 mine waste samples were available for hexavalent *chromium and considered adequate to characterize mine waste*. [Emphasis added]. Please provide the Test Adequacy analysis. Note the quantitative criteria is not listed in the DQO section.

- **Specific comment 29: Page 46; First full paragraph; last sentence** In general, results of the statistical power analysis indicate that the Phase 2 Mine Waste sampling program collected sufficient number of samples to service statistical hypothesis tests relevant to the DQOs for mine waste investigation
(Appendix 4-A) The results of the statistical power assessment are detailed in Section 6.2.1.4. It is not clear why BP is generalizing/summarizing findings in section 5.0 and pushing off technical analysis until later in the doc. Also this summary is not true and is not supported by statements made in Section 8
- **Specific comment 31: Page 48; 5.4.5 Multivariate Principal Component Analysis; first paragraph; second sentence.** In theory, metals and other measured physical properties that are grouped together are interpreted to originate from the same physical source or undergo similar in situ physical and chemical processes. This may be true for a natural deposit; however, the concentration of COCs observed today are a consequence of the following and may have little physico-chemical meaning:
 1. Initial natural variability of the deposit, wasterock, overburden, and natural soils/bedrock
 2. time-dependent man-made variability introduced by excavation and placement history
 3. time-dependent variability introduced by leaching and transport, and
 4. variability introduced by sampling design (grid size, support, REV, etc.).Regardless, the PCA was not instrumental to the conclusions.
- **Specific comment 33: Page 54; second full paragraph; second sentence:** Eighteen of the 20 RI/FS metals for the 0- to 0.5-foot bgs depth and 17 of the 20 metals for the 1.5- to 2.0-foot bgs depth exhibit a range value greater than 400 feet thereby indicating that the *Phase 2 sampling design was overall adequate for: 1) capturing the spatial heterogeneity of metal distributions for these sampling depths and 2) collecting an adequate sample number to service the statistical hypothesis testing detailed in the DQOs for the mine waste investigation*. [Emphasis added] The conclusion regarding adequacy are incorrect—they do not meet the DQOs for all of the TAL metals. This was anticipated in the Tribe's comments on the workplan for both Phases I and II. Also note the ranges are not reported by particle-size cutoff—these could result in shorter ranges. In summary, BP did not acquire enough specimens that contain the most variable COC. This is required to enable discrimination between unaffected (PRB) and affected populations.
- **Specific comment 34: Page 58: Second full paragraph; last sentence:** Results of the statistical hypotheses tests evaluating differences in metals concentrations with depth are provided in Appendix 6-D. In all cases, cannot reject the null due to poor statistical power (low n). The Tribe forewarned EPA/BP on this concern in comments on both Phase I and Phase II characterization workplans.
- **Specific comment 43: Page 81; Section 8.4.1.1 Human Health Receptors and Exposure Pathways;**

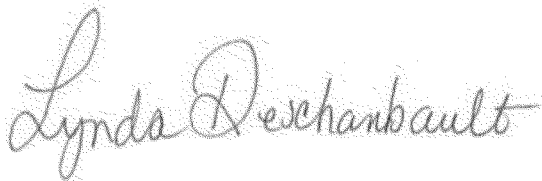
Paragraph 1; Sentence 2: As described in Section 6.2.1.1, the variograms indicate that the soil has low variation over short distances (auto correlated), but becomes more heterogeneous over longer distances (on the order of less than 1,000 feet for most metals). The tables value of ranges is much shorter than the 1000 feet grid size. Some of which are shorter than 400 feet meaning that areas between the grid are still not characterized from COCs. Also some COCs do not meet the statistical power requirements described in EPA 1992.

On or before December 31, 2017, As part of a draft RI/FS submittal, please fully incorporate these EPA comments and prepare and submit a full complete and final robust Mine Waste Characterization chapter for the RI/FS report, and completion of the baseline risk assessment for mine waste.

Please also at the same time, develop the remaining media specific reports (TDSRs) (i.e. surface water, groundwater, sediment/floodplain, and Reference) to be responsive and incorporate all of these same EPA comments. Please ensure delivery of those TDSRs are timed sufficient to allow for submittal of an inclusive draft RI/FS by December 31, 2017 and a complete and final RI/FS by August 30, 2018.

If you have any questions, please feel free to contact me at (415) 947-4183 or Deschambault.lynda@epa.gov.

Sincerely,

A handwritten signature in cursive script that reads "Lynda Deschambault". The ink is dark and the signature is fluid, with the first name "Lynda" being more prominent than the last name.

Lynda Deschambault
Remedial Project Manager

Cc by electronic Email:

Douglas Carey, California Regional Water Quality Control Board, Lahontan Region
Diane Vitals, Washoe Tribe of Nevada and California
David Friedman, Nevada Department of Environmental Protection
Kenneth Maas, United States Forest Service
Tom Maurer, United States Fish and Wildlife Service Toby McBride,
United States Fish and Wildlife Service Steve Hampton, California
Department of Fish and Wildlife Marc Lombardi, AMEC
Neil Mortimer, Washoe Tribe of Nevada and California

Attachment 1
Draft Mine Waste Technical Data Summary Report (TDSR) April 23, 2016
Section 5.3 Data Quality Assessment and Appendix 5-E – Data Quality Summary Worksheet

Compared findings to 2016 Revised RI/FS QAPP requirements for DQA, and EPA *Data Quality Assessment: A Reviewer's Guide EPA QA/G-9R*, February 2006

Section 5.3, Data Quality Assessment (DQA)

General Comment 1: As noted in our comments, EPA's 2006 guidance requires the following steps for performing a DQA:

- 1) review project objectives and sampling design
- 2) conduct preliminary data review
- 3) select statistical method
- 4) verify assumptions of the method
- 5) draw conclusions from the data.

General Comment 2: Section 5.3 text only provides a summary of the first activity in Step 2 of the 5 steps in the DQA process. The RI/FS QAPP provides a worksheet (Attachment 7 in QAPP) for reviewing the data quality, which was filled out and provided as Appendix 5-E. According to the Appendix 5-E worksheet, not all the 2011 and 2012 data has been validated; therefore, this data quality review is not complete.

Per the QAPP and EPA's DQA process, it is necessary to review other factors beyond laboratory analytical data and include the evaluation in the DQA, such as the sampling design, and statistical methods and graphs. This is not mentioned in the DQA section. Please ensure integration in the TSDR between the DQOs, the statistical methods, and the DQA. Section 7.1, Reconciliation with DQOs, is a continuation of the DQA process.

In Section 4.3.6, DQO Step-6-Specify Performance or Acceptance Criteria, the text indicates that a quantitative criteria will be evaluated prior to the comparison of data sets in statistical analyses and will include: (1) detectable concentrations of individual RI/FS metals in more than four samples in sample populations with less than 40 or more samples, (2) data set consists of 10 or more samples representative of a specific medium, and (3) data set represents a single population as determined by exploratory data analysis. The text explains that if these quantitative criteria are not met, a qualitative evaluation of the data set will be conducted, and the need for additional sample collection will be considered. Please ensure that this type of statistical comparison is discussed in the DQA section or clearly provide reference to the TDSR, Section 7.1, Reconciliation with DQOs.

Section 5.4, Data Interpretation methods, discusses various models and data analysis methods and also refers the reader to Section 6.0, Mine Waste Characterization, for other traditional data interpretation methods. Please first reference the DQO steps, without that, it is unclear if these methods are being used to provide the type of statistical analysis described in DQO Step 6.

ARC sometimes provides DQO references throughout Section 5.4 and in Section 6.2. The fourth paragraph of Section

5.4.1 states, “In general, results of the statistical power analysis indicate that the Phase 2 Mine Waste sampling program collected sufficient number of samples to service statistical hypothesis test relevant to the DQOs for mine waste investigation.” Also, in Section 6.2.1.2, Phase 2 Variogram and Stochastic Interpolation Results, second paragraph, ARC explains “.... the Phase 2 sampling design was overall adequate for: 1) capturing the spatial heterogeneity of metal distributions for these sampling depths and 2) collecting an adequate sample number to service the statistical hypothesis testing detailed in the DQOs for the mine waste investigation.” Please provide sufficient detail, to ensure that these statements are easily correlated with the DQO Step 6 criteria, explained in Section 4.3.6.

General Comment 3: The information in Section 5.3 lacks logical presentation, meaningful to the DQA process. Please revise the DQA section to correspond to the QAPP/ EPA’s DQA steps, with references to the appropriate section in the TSDR that complete this DQA process. Furthermore, as written now, each subsection provides excerpts of data quality review information with no apparent rationale for inclusion. Please see the following specific comments for examples.

- **Specific Comment 1: Section 5.3.1 Reports.** The purpose of this section is out of context and unclear. Please ensure adherence with the approved QAPP. Also, please clarify, integrate, or delete the four sentences explaining items related to data
 - RI/FS metals data were generated by ARC according to FRI sampling plans based on a specific sampling design at specific locations;
 - methods and detection limits were documented in the annual reports;
 - metal concentrations reported between reporting limit and method detection limit were estimated; and
 - metals reported as non-detected were less than the reporting limit.
- **Specific Comment 2: Section 5.3.2 Documentation.** Please ensure the discussion of missing data is included in a section describing the completeness goal. This section begins explaining that samples were collected in accordance with FRI sampling plans, and using chain of custody records and standard operating procedures. Then the text describes a few changes from the proposed sampling plan, which included discussion of insufficient sample volume for bulk and fine fractions and insufficient soil for mercury and hexavalent chromium. Rather than discuss together here, please include in the completeness goal.
- **Specific Comment 3: Section 5.3.3 Data Sources.** This section is not necessary, it provides a very brief discussion of how many samples were collected, which was already discussed earlier in detail in Section 5.2.
- **Specific Comment 4: Section 5.3.4 Analytical Methods and Detection Limits.** This section explains that methods and reporting limits were consistent with the QAPP. And then goes on to discuss frequency of metals detection. It is unclear why frequency is relevant. The text also explains that reporting limits were increased based on conditions specific to a sample. This is a common occurrence due to sample matrix interference or concentrations outside the calibration range that require dilution of the sample and is reviewed during data validation. Therefore, it is not necessary to explain this concept – this would be discussed in the QCSR or data validation reports. Then the text also explains that reporting limits were lower in surficial mine waste data than borehole data, but met the required screening levels. It is unclear why this is mentioned and how to interpret this information. Why were the reporting limits different? Were they elevated in the borehole data due to dilutions or matrix interference? If this is an important concept or deviation from QAPP, then more explanation is needed. Otherwise this issue would be addressed in the QCSR or data validation reports.

- **Specific Comment 5: Section 5.3.5 Data Quality Indicators:** The last paragraph does not entirely commit to a specific conclusion about whether the data quality meets the project's data quality indicators. The text states *"Overall, the data quality for the RI/FS mine waste data were found to be adequate such that the data can be used for quantitative evaluation."* However, the text then continues with this statement, *"The specific exceptions noted for the data described herein will be considered as conclusions about the data are made."* Please remove reference to future conclusions about the data. The conclusion about the quality of the data is the purpose of this report, and should be made herein.

Furthermore, the specific exceptions referenced include two bullets, one is a discussion of rejected data and the other is a discussion of data that is qualified as estimated. Rejected data cannot be used for evaluation; therefore, there is no reason to consider this data at some future time. In addition, qualified estimated data should be available for the intended use. Once the data is validated and appropriate data qualifiers (and usability codes) are added to the database, with any necessary adjustments to the reporting limits (such as for blank contamination), then the data should support the intended use. There is no reason for ARC to postpone this evaluation, once the validation and verification step has been completed and documented in the QCSRs and this data quality summary.

If the data quality is still in question, then provide text to describe appropriate corrective action should be taken i.e. please clarify if ARC finds it necessary to collect additional samples or review the validation findings again, and explain that here in this text.

Appendix 5-E, Data Quality Summary Worksheet

- **Specific Comment 6: Assessment Question "Summarize the effect of field sampling issues on data usability, if applicable," page 5 of 20.** The ARC response provides two bullets that do not adequately explain the issue and how data is impacted. The first bullet states that Phase 1 mine waste samples that were sieved are not comparable to mine waste samples submitted for laboratory analysis. Please include text to explain why the data is not comparable, and how the data for either type of sample is to be utilized. The second bullet states that Phase 2 mine waste samples were tested on a bulk basis and a subset was also sieved and borehole mine waste samples were tested on a bulk basis. Please include text to explain what this difference means for utilizing the data or comparing data.
- **Specific Comment 7: Assessment Question "Accuracy – How were matrix difficulties handled?"** Information was provided for 2014, 2012, and 2011. Please include 2013.
- **Specific Comment 8: Assessment of Completeness.** ARC may have inconsistently or incorrectly calculated and documented the completeness goal. According to the QAPP, completeness is the amount of valid data obtained compared to the amount that was expected under ideal conditions. Missing data that contribute to lack of completeness includes planned samples that were not collected, or not analyzed, as well as rejected data.

However, the Appendix 5-E Data Quality Summary Worksheet, last assessment question (Was completeness goal met for the data?) refers to Table 5E-4 for summary of completeness. Table 5E-4 is a summary of the percentage of data points that are qualified based on the type of qualifier (i.e. estimated, rejected, or by various laboratory

qualifiers). This summary table does not portray completeness. How data is qualified, is irrelevant unless it is rejected. Rejected data or data that is not collected as planned due to a field issue would count towards the completeness goal. Note also, that the Appendix 5-E worksheet, on page 9 of 20 the question is asked whether there are problems associated with data completeness and the response provided describes percentages of completeness that do not match the information on Table 5E-4. Please include text to clarify how completeness is evaluated, ensure it is consistently calculated using the same methodology, and reported correctly the worksheet and tables.